RUBELLA
(German Measles)
Report Immediately

✓DISEASE AND EPIDEMIOLOGY

Clinical description:

Postnatal Rubella

When contracted after birth, rubella is usually a mild disease characterized by a generalized maculopapular rash, swollen lymph nodes, and slight fever. Up to 50% of rubella infections are thought to be asymptomatic or subclinical. In children, the rash is usually the first sign of illness. Older children and adults may experience a 1-5 day prodrome prior to rash onset consisting of a low-grade fever, malaise, lymphadenopathy, and upper respiratory symptoms. The rash is often quite variable, complicating diagnosis. The rash usually begins on the face and then progresses from head to foot. It usually lasts about 3 days and is often more prominent after a hot shower or bath.

Complications of rubella are not common, but they tend to occur more often in adults than in children. Although rare in children and adults males, arthralgia or arthritis may occur in up to 70% of adult women who contract rubella. Joint symptoms usually occur with rash onset and may last for up to 1 month. Rare complications include chronic arthritis, thrombocytopenic purpura, and encephalitis.

Congenital Rubella Syndrome (CRS)

Infection with rubella during early gestation can result in a variety of physical abnormalities referred to as CRS. The severity of the effects of rubella on the fetus depends largely on the time of gestation when infection occurs. Up to 90% of infants born to mothers infected in the first trimester will develop CRS. Additionally, infection may lead to fetal death, spontaneous abortion, or premature delivery. CRS can have a multitude of manifestations, including deafness, blindness, heart defects, behavioral disorders, mental retardation, growth retardation, bone disease, enlarged liver and spleen, thrombocytopenia, and purple skin lesions. Symptoms of CRS may not develop for 2-4 years.

Causative agent:

Rubella is caused by a togavirus. It is most closely related to group A arboviruses, such as eastern and western equine encephalitis viruses. It is an enveloped RNA virus, with a single antigenic type that does not cross-react with other members of the togavirus group.

Differential diagnosis:

The differential diagnosis includes, but is not limited to, measles, fifth disease, enterovirus infection, scarlet fever, roseola, Kawasaki's disease, and drug reaction.

Laboratory identification:

Because many rashes can mimic that of rubella, laboratory identification is the only way to confirm a diagnosis.

IgM Serology:
Several laboratory methods to measure IgM levels are available and may be used to screen for immunity and/or test for disease. The preferred method is IgM EIA, however, LA tests and IFA assays are also acceptable. IgM antibodies may not be detectable until 5 days after rash onset. If a negative IgM result is obtained from serum drawn less than 5 days after rash onset, then IgM testing should be repeated. When testing for postnatal rubella, specimens should be collected at least 3 days after rash onset. When testing for CRS, specimens should be collected as soon as possible. False-positive serum rubella IgM tests have occurred in persons with parvovirus infections or positive heterophile test (indicating infectious mononucleosis) or with a positive rheumatoid factor (indicating rheumatologic disease). When a false-positive rubella IgM is suspected, a rheumatoid factor, parvovirus IgM, and heterophile test should be used to rule out a false-positive rubella IgM test result.

IgG Serology:
IgG testing for acute rubella requires demonstration of a rise in titer of antibody against rubella virus, so two serum specimens are always required. The first specimen should be drawn as soon after rash onset as possible. The second specimen should be drawn 7-14 (preferably 14-21) days later. Rubella needs to be diagnosed in a timely manner, for this reason, IgG serology testing for acutely ill patients is not recommended.

Viral Culture:
Virus isolation and genetic characterization can take several weeks to complete, and therefore should not be used as a routine method to diagnose rubella. However, virus isolation is important in determining the geographic origin of the virus, and collecting clinical specimens for viral isolation should be done at the same time as samples taken for serologic or RT-PCR testing. Only once serological results come back positive for rubella should the culture specimen be sent for testing. Virus may be isolated from one week before to 2 weeks after rash onset, however maximum viral shedding occurs in the first 4 days after rash onset. Throat swabs or oropharyngeal swabs usually produce the best results, but virus can also be isolated from nasopharyngeal swabs and urine. For infants with suspected CRS a NP swab may be pooled with a throat swab to ensure an adequate sample. Submission to CDC should be coordinated through UDOH epidemiologist.

RT-PCR:
Along with viral culture, RT-PCR can determine the geographic origin of the virus. However, RT-PCR can take several weeks to perform and should not be used for initial diagnosis. Throat swabs or oropharyngeal swabs usually produce the best results, but virus can also be isolated from nasopharyngeal swabs and urine. For infants with suspected CRS a NP swab may be pooled with a throat swab to ensure an adequate sample. Submission to CDC should be coordinated through UDOH epidemiologist.

Treatment:
There is no specific treatment for rubella.

Case fatality:
Rubella is rarely a fatal disease.

Reservoir:
Humans are the only known hosts of rubella virus.

Transmission:
Rubella is spread through respiratory droplets generated by coughing and sneezing and by direct contact with respiratory secretions of ill persons. Transplacental infection resulting in CRS occurs in infants who are born to women with rubella occurring at 20 weeks or less of gestation.

Susceptibility:
Prior to the introduction of the vaccine, rubella was considered a childhood disease. However, anyone can get rubella. In 2004, the CDC determined that vaccination efforts had eradicated the virus in the United States. All cases now occurring in the US are either imported from an area where rubella virus is still circulating, or are linked to a case with imported rubella virus. Rubella cases can occur throughout the year, but tend to peak in late winter and spring.

Incubation period:
The incubation period is usually 16–18 days, with a range of 14–23 days.

Period of communicability:
The infectious period is usually from seven days before to seven days after rash onset. Asymptomatic persons may be infectious for 30 days after their exposure. Infants with CRS may spread disease for up to 1 year.

Epidemiology:
Before the widespread use of rubella vaccine, which was licensed in 1969, peaks of rubella incidence occurred in the US every 6–9 years. In 1964-1965 a rubella epidemic in the United States resulted in 12.5 million cases of rubella infection and about 20,000 newborns with CRS. This epidemic caused more than 2,000 cases in Utah alone. The estimated cost of the epidemic was $840 million.
Most reported rubella cases in the US now occur in persons born in areas where rubella vaccine is not routinely given. Adults born in the US before 1957 are considered to be immune to rubella because of the high probability that they have been infected naturally during childhood. The last documented case of postnatal rubella in Utah occurred in 2004.

✓PUBLIC HEALTH CONTROL MEASURES

Public health responsibility:
- Promote vaccination to prevent disease.
- Identify all cases and susceptible exposed people rapidly.
- Ensure appropriate management of exposed pregnant women.
- Identify the source of infection through genotyping of viral isolates

Prevention:
Vaccination is the primary method of prevention.

Chemoprophylaxis:
Although vaccination given after exposure has not been demonstrated to prevent illness, it could theoretically prevent illness if given within 72 hours of exposure. Immune globulin (IG) is not

recommended for routine use, even in women exposed to rubella in early pregnancy. IG should be considered only if termination of the pregnancy is not an option. Limited data shows that the probability of clinically apparent infection after IG administration in exposed persons decreases. However, a lack of clinical symptoms does not guarantee that the fetus will not be infected. Infants with congenital rubella have been born to mothers who received IG shortly after exposure.

Vaccination:

Persons generally can be considered immune to rubella if they have documentation of vaccination with at least one dose of rubella-containing vaccine (MMR). At least 95% of vaccinees aged 12 months and older will develop serologic evidence of rubella immunity after a single dose. One dose of vaccine is considered to provide long-term, likely lifelong, protection. The first dose of MMR is given at 12-15 months of age. A second dose is given at 4-6 years of age to produce immunity to measles and mumps in those who failed to respond to the first dose.

MMR is a live, attenuated vaccine, and therefore pregnant women and persons with an impaired immune system should not receive the vaccine. Nonpregnant women should avoid becoming pregnant within 28 days after the last dose of vaccination. Breastfeeding is not a contraindication for MMR vaccination.

Some persons mistakenly believe that the MMR vaccine causes autism. The first recognizable signs of autism generally appear around one-year of age, which coincidentally is the same time children receive the first dose of MMR vaccine. Carefully performed scientific studies have found only a temporal (time) association between these two events, and no causal relationship between MMR vaccine and autism.

Isolation and quarantine requirements:

Isolation: Non-hospitalized persons with postnatal rubella should be voluntarily isolated in their home until 7 days after rash onset. Infants diagnosed with CRS should be considered contagious until they are at least 1 year old, unless NP and urine cultures after 3 months of age are repeatedly negative, and care should be taken to reduce exposure.

Hospital: In addition to standard precautions, for postnatal rubella, droplet precautions are recommended for 7 days after rash onset. Contact isolation is indicated for children with suspected or confirmed congenital rubella until they are at least 1 year of age, unless NP and urine culture results after 3 months of age are repeatedly negative for rubella virus.

Quarantine: Exposed persons without valid evidence of immunity should remain home in voluntary quarantine for 3 weeks after the rash onset in the reported case. Valid evidence of immunity is documentation of 1 dose of rubella-containing vaccine, physician-diagnosed rubella, laboratory evidence of immunity, or birth before 1957.

✓CASE INVESTIGATION

Reporting:

If rubella is at all suspected, it should be reported immediately to the local health department or the Utah Department of Health. All cases of should be reported to the local health department or the Utah Department of Health.

Case Definition:

Rubella (2007):

Clinical Case Definition

An illness characterized by all the following:

- Acute onset of generalized maculopapular rash,
- Temperature greater than 99.0 F (greater than 37.2 C), if measured, and
- Arthralgia/arthritis, lymphadenopathy, or conjunctivitis.

Laboratory Criteria

- Isolation of rubella virus, or
- Significant rise between acute- and convalescent-phase titers in serum rubella immunoglobulin G antibody level by any standard serologic assay, or
- Positive serologic test for rubella immunoglobulin M (IgM) antibody.

Case Classification

Suspect: Any generalized rash illness of acute onset.

Probable: A case that meets the clinical case definition, has noncontributory or no serologic or virologic testing, and is not epidemiologically linked to a confirmed case.

Confirmed: A case that is laboratory confirmed or no serologic or meets the clinical case definition and is epidemiologically linked to a confirmed case.

Epidemiologic classification:

Internationally imported case:

A case in which rubella results from exposure to rubella virus outside the United States as evidenced by:

- at least some of the exposure period (12-23 days before rash onset) occurring outside the United States,
- rash onset occurring within 23 days of entering the United States, and
- no known exposure to rubella in the U.S. during that time.

U.S.-acquired case:

A case in which the patient:

- had not been outside the United States during the 23 days before rash onset or
- was known to have been exposed to rubella within the United States.

U.S.-acquired cases are further classified into four mutually exclusive groups:

Import-linked case: Any case in a chain of transmission that is epidemiologically linked to an internationally imported case.

Imported-virus case: A case for which an epidemiologic link to an internationally imported case was not identified but for which viral genetic evidence indicates an imported rubella genotype, i.e., a genotype that is not occurring within the United States in a pattern indicative of endemic transmission. An endemic genotype is the genotype of any rubella virus that occurs in an endemic chain of transmission (i.e., lasting ≥12 months). Any genotype that is found repeatedly in U.S.-acquired cases should be thoroughly investigated as a potential endemic genotype, especially if the cases are closely related in time or location.

Endemic case: A case for which epidemiological or virological evidence indicates an endemic chain of transmission. Endemic transmission is defined as a chain of rubella virus transmission continuous for ≥12 months within the United States.
Unknown source case: A case for which an epidemiological or virological link to importation or to endemic transmission within the U.S. cannot be established after a thorough investigation. These cases must be carefully assessed epidemiologically to assure that they do not represent a sustained U.S.-acquired chain of transmission or an endemic chain of transmission within the U.S.

Rubella, Congenital Syndrome (2007):

Clinical Description

Presence of any defect(s) or laboratory data consistent with congenital rubella infection. Infants with congenital rubella syndrome usually present with more than one sign or symptom consistent with congenital rubella infection. However, infants may present with a single defect. Hearing impairment is the most common single defect. An illness, usually manifesting in infancy, resulting from rubella infection in utero and characterized by signs or symptoms from the following categories:

Clinical Case Definition

a) Cataracts/congenital glaucoma, congenital heart disease (most commonly patent ductus arteriosus or peripheral pulmonary artery stenosis), hearing impairment, pigmentary retinopathy.
b) Purpura, hepatosplenomegaly, jaundice, microcephaly, developmental delay, meningoencephalitis, radiolucent bone disease.

Laboratory Criteria

- Isolation of rubella virus, or
- Demonstration of rubella-specific immunoglobulin M (IgM) antibody, or
- Infant rubella antibody level that persists at a higher level and for a longer period than expected from passive transfer of maternal antibody (i.e., rubella titer that does not drop at the expected rate of a twofold dilution per month), or
- PCR positive rubella virus.

Case Classification

Suspect: A case with some compatible clinical findings but not meeting the criteria for a probable case.
Probable: A case that is not laboratory confirmed and that has any two complications listed in paragraph "a" of the clinical case definition or one complication from paragraph "a" and one from paragraph "b", and lacks evidence of any other etiology.*
Confirmed: A clinically consistent case that is laboratory confirmed.
Infection only: A case that demonstrates laboratory evidence of infection, but without any clinical symptoms or signs.

*In probable cases, either or both of the eye-related findings (cataracts and congenital glaucoma) count as a single complication. In cases classified as infection only, if any compatible signs or symptoms (e.g., hearing loss) are identified later, the case is reclassified as confirmed.

Epidemiologic classification:

Congenital Rubella Syndrome cases will be classified epidemiologically as internationally imported or U.S.-acquired, according to the source of infection in the mother, using the definitions below, which parallel the classifications for rubella cases.

Internationally imported case:

To be classified as an internationally imported CRS case, the mother must have:

- acquired rubella infection outside the U.S. or
- in the absence of documented rubella infection, the mother was outside the United States during the period when she may have had exposure to rubella that affected her pregnancy (from 21 days before conception and through the first 24 weeks of pregnancy).

U.S.-acquired case:

A U.S.-acquired case is one in which the mother acquired rubella from an exposure in the United States.

U.S.-acquired cases are further classified into four mutually exclusive groups:

Import-linked case: Any case in a chain of transmission that is epidemiologically linked to an internationally imported case.

Imported-virus case: A case for which an epidemiologic link to an internationally imported case was not identified but for which viral genetic evidence indicates an imported rubella genotype, i.e., a genotype that is not occurring within the United States in a pattern indicative of endemic transmission. An endemic genotype is the genotype of any rubella virus that occurs in an endemic chain of transmission (i.e., lasting ≥12 months). Any genotype that is found repeatedly in U.S.-acquired cases should be thoroughly investigated as a potential endemic genotype, especially if the cases are closely related in time or location.

Endemic case: A case for which epidemiological or virological evidence indicates an endemic chain of transmission. Endemic transmission is defined as a chain of rubella virus transmission continuous for ≥12 months within the United States.

Unknown source case: A case for which an epidemiological or virological link to importation or to endemic transmission within the U.S. cannot be established after a thorough investigation. These cases must be carefully assessed epidemiologically to assure that they do not represent a sustained U.S.-acquired chain of transmission or an endemic chain of transmission within the U.S.

Case investigation process:

All highly suspect cases of rubella warrant immediate action. Cases of rubella should be managed as follows:

- Local and state health departments should be immediately notified.
- Appropriate laboratory samples and preliminary clinical and epidemiologic information (including vaccine history and travel history) should be obtained.
- Strict isolation should be imposed until 7 days after rash onset.
- All case contacts should be identified and appropriately managed (explained in detail below).
- The source of the exposure should be identified.

Outbreaks:

A single case of rubella is considered an outbreak. Identify all close contacts and define population groups at specific risk and immunize.

Identify case contacts:

Close contacts are people who have the following contact with the case patient during the infectious period (7 days before rash onset to 7 days after rash onset):

- Household and immediate family members (those who spend many hours together or sleep under the same roof);
- Those who have direct contact with respiratory secretions;
- Healthcare workers with face-to-face contact with a patient; and
- Those who share confined space during the communicable period. Such contacts may include:
  - Core groups of close friends, social contacts, boyfriends, girlfriends,
  - Students within the same kindergarten class or grade level,
  - Contacts at church activities and employment,
  - Participants in extracurricular activities (such as fieldtrips),
  - Children attending after-school care or a playgroup.

Case contact management:

- Assess immunity. One dose of rubella-containing vaccine (MMR), documentation of physican-diagnosed rubella, or birth before 1957 are considered proof of immunity. Contacts must be able to produce documentation of vaccination – a verbal history of vaccination is not sufficient.
- Assess pregnancy status.
- Vaccinate susceptible contacts.
- Work with susceptible pregnant contacts' physicians to determine if administration of IG is necessary.
- Provide educational materials informing of exposure and recommending vaccination.

✓REFERENCES

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